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10/754,172	01/09/2004	Stephan Dobritz	2003 P 50104 US	8452

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EXAMINER

TANG, MINH NHUT

ART UNIT

PAPER NUMBER

2829

DATE MAILED: 11/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/754,172

Applicant(s)

DOBRITZ ET AL.

Examiner

Minh N. Tang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on amendment filed on August 29, 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,2,4-17 and 19-24 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,4-17 and 19-24 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01/09/20004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Claim Objections***

1. Claims 4, 7, 9 and 19 are objected to because of the following informalities:

a/ in claims 4 and 19, since "the conductor tracks" refers to "a conductor tracks" recited in claims 23 and 24, respectively, therefore claims 4 and 19 should depend upon claims 23 and 24, respectively.

b/ in claim 7, line 2, it has been held that the recitation that an element is "capable of" performing a function is not a positive limitation but only requires the ability to so perform, therefore "capable of" should be deleted.

c/ in claim 9, line 18, "the contact" should be -- the contacts --.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

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consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1-2, 5-17 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Farnworth (U.S.P. 5,982,185) in view of Farnworth et al. (U.S.P. 6,222,280).

As to claim 1, Farnworth discloses, in Figs. 1 and 8, a carrier (10, Fig. 1), wherein the carrier (10) comprises: a support structure (16MB); first contacts (44MB) disposed on a first surface (i.e., upper surface) of the support structure (16MB) and arranged in a pattern; bumps (42MB) provided on the first surface (upper surface) of the support structure (16MB); second contacts (60MB) formed on the bumps (42MB), wherein the second contacts (60MB) are electrically connected to the first contacts (44MB); and at least one opening (48I, Fig. 1) in the support structure (16MB) wherein a die (12) placed on the support structure (16MB) is drawn against the bumps (42MB) by a force generated by a vacuum and applied through the opening (48I). Farnworth does not disclose the bumps are made of elastomer and third contacts, arranged in a pattern, disposed on a second surface of the support structure, the second surface opposite to the first surface, wherein the third contacts are electrically connected to the first contacts through conductors in the support structure. Farnworth et al. disclose, in Fig. 4B, a support structure (20G), first contacts (44B) formed on a first surface (i.e., upper surface) of the support structure (20G); elastomeric contacts (24B) used to establish temporary electrical connections with planar contacts (14) on a semiconductor component (10); third contacts (52), arranged in a pattern, disposed on a second

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surface (i.e., backside surface) of the support structure (20G), the second surface (backside surface) opposite to the first surface (upper surface), wherein the third contacts (52) are electrically connected to the first contacts (44B) through conductors (50) in the support structure (20G). It would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the carrier of Farnworth by providing elastomeric material to the bumps and a third contacts as taught by Farnworth et al. so that by using elastomers, the elastomeric contacts are naturally resilient to provide compliancy characteristics and help to prevent excessive contact forces from damaging the contact locations on the component and a test circuitry would be in electrical communication with the component through the third contacts formed on the backside of the support structure.

As to claims 2 and 17, Farnworth discloses in Fig. 1 and 8, the second contacts (60MB) are comprised of gold.

As to claims 5-6 and 20, Farnworth discloses in Figs. 1 and 8, a gold-gold contact is realized between the die (12) and the carrier (10) by a re-distribution layer (see, for example Fig. 4) arranged on the die (12), and wherein the re-distribution layer comprises a copper-nickel-gold layer construction.

As to claims 7 and 11, Farnworth in view of Farnworth et al. disclose the fixing of the die (12) takes place by a cover (18) overlying the support structure (16MB) and being affixed to a frame (14) that is attached to the support structure (16MB), wherein the cover (18) compresses the elastomer bumps (42MB) with a predetermined pressing force after placing.

As to claims 8 and 13, Farnworth discloses in Fig. 1, the cover (18) is formed as a spring element.

As to claims 9 and 15-16, Farnworth discloses, in Figs. 1 and 8, a method of processing a semiconductor die (12), the method comprising: providing a semiconductor die (12), the die (12) including contacts (50) formed in a pattern; providing a carrier (10), the carrier (10) comprising of a support structure (16MB) with first contacts (44MB) disposed over a surface of a support structure (16MB) and arranged in a pattern, bumps (42MB) provided on the surface of the support structure (16MB) on which the first contacts (44MB) are present, and second contacts (60MB) formed on the bumps (42MB), wherein the second contacts (60MB) are arranged in a pattern corresponding to the pattern on the die (12), the second contacts (60MB) being electrically coupled to the first contacts (44MB); placing the die (12) on the support structure (16MB) of the carrier (10); securing the contacts (50) of the die (12) against the bumps (42MB) by a predetermined force generated by a vacuum (see column 3, lines 35-45); and evaluating (i.e., full functionality testing and burn-in testing) the semiconductor die (12) by electrically coupling the contacts (50) of the die (12) to a tester. Farnworth does not disclose the bumps are made of elastomer and third contacts, arranged in a pattern, disposed on a surface of the support structure opposite to the surface of the support structure on which the first contacts are present, wherein the third contacts are electrically connected to the first contacts through conductors in the support structure. Farnworth et al. disclose, in Fig. 4B, a support structure (20G), first contacts (44B) formed on a first surface (i.e., upper surface) of the support structure

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(20G); elastomeric contacts (24B) used to establish temporary electrical connections with planar contacts (14) on a semiconductor component (10); third contacts (52), arranged in a pattern, disposed on a second surface (i.e., backside surface) of the support structure (20G), the second surface (backside surface) opposite to the first surface (upper surface), wherein the third contacts (52) are electrically connected to the first contacts (44B) through conductors (50) in the support structure (20G). It would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the carrier of Farnworth by providing elastomeric material to the bumps and a third contacts as taught by Farnworth et al. so that by using elastomers, the elastomeric contacts are naturally resilient to provide compliancy characteristics and help to prevent excessive contact forces from damaging the contact locations on the component and a test circuitry would be in electrical communication with the component through the third contacts formed on the backside of the support structure.

As to claim 10, Farnworth discloses in Figs. 1 and 8, the die (12) is secured by a vacuum until the contacts (50) of the die (12) are fixed against the elastomer bumps (42MB).

As claim 12, Farnworth discloses in Figs. 1 and 8, the pressing force is approximately 2 to 8 grams per elastomer bump (42MB).

As to claim 14, Farnworth discloses in Figs. 1 and 8, providing a semiconductor die (12) comprises: fabricating a wafer (not shown) that includes a plurality of semiconductor dies (12); and separating the wafer to provide the semiconductor die (12).

5. Claims 4, 19 and 23-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Farnworth (U.S.P. 5,982,185) and Farnworth et al. (U.S.P. 6,222,280) as applied to claims 1 and 9 above, and further in view of Hidekatsu (JP 10-197557).

As to claims 23 and 24, Farnworth in view of Farnworth et al. discloses all the limitations recited in the claims except for the electrical connection of the first contacts to the second contacts is established by conductor tracks rising on the elastomer bumps in a spiral or arcuate manner to a tip of the elastomer bumps. Hidekatsu discloses, in Figs. 1(a)-1(c), a contact structure comprising bumps (13), and electrical connection of a first contacts (lower 15) to a second contacts (upper 15) is established by conductor tracks (middle 15) rising on the bumps (13) in a spiral or arcuate manner to a tip of the bumps (13). It would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the carrier of Farnworth by providing the connection between the first contacts to the second contacts in a form of conductor tracks rising on the bumps in a spiral or arcuate manner as taught by Hidekatsu in order to take a positive electric flowing, a good contact when the bumps are pressed against an inspected object.

As to claims 4 and 19, Hidekatsu discloses in Figs. 1(a)-1(c), the conductor tracks (15) comprise a copper-nickel-gold layer construction.

6. Claims 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Farnworth et al. (U.S.P. 5,559,444) in view of Farnworth et al. (U.S.P. 6,222,280) and Farnworth (U.S.P. 5,982,185).

As to claim 21, Farnworth et al. ('444) discloses, in Figs. 1, 2 and 5, a carrier (10) comprising a support structure (12); a frame (14) fastened on the support structure (12) on a first surface (i.e., upper surface) and including four walls (56, Figs. 1B, 5B) to surround the first surface (upper surface) of the support structure (12) of a size that corresponds to a size of a semiconductor die (18), and upper portion of the walls (56) being beveled in a direction toward the first surface (see Fig. 5B and column 6, lines 21-23); first contacts (40, Fig. 2) disposed on the first surface (upper surface) of the support structure (12); bumps (26) disposed on the first surface (upper surface) of the support structure (12); second contacts (34, Fig. 2) formed on the bumps (26), wherein the second contacts (34) are electrically connected to the first contacts (40). Farnworth et al. ('444) does not disclose the bumps are made of elastomer; third contacts, arranged in a pattern, disposed on a second surface of the support structure, the second surface opposite to the first surface, wherein the third contacts are electrically connected to the first contacts through conductors in the support structure; and at least one opening in the support structure wherein the die placed on the support structure is drawn against the bumps by a force generated by a vacuum and applied through the opening.

Farnworth et al. ('280) discloses, in Fig. 4B, a support structure (20G), first contacts (44B) formed on a first surface (i.e., upper surface) of the support structure (20G); elastomeric contacts (24B) used to establish temporary electrical connections with planar contacts (14) on a semiconductor component (10); third contacts (52), arranged in a pattern, disposed on a second surface (i.e., backside surface) of the support structure (20G), the second surface (backside surface) opposite to the first surface

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(upper surface), wherein the third contacts (52) are electrically connected to the first contacts (44B) through conductors (50) in the support structure (20G). It would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the carrier of Farnworth et al. ('444) by providing elastomeric material to the bumps and a third contacts as taught by Farnworth et al. ('280) so that by using elastomers, the elastomeric contacts are naturally resilient to provide compliancy characteristics and help to prevent excessive contact forces from damaging the contact locations on the component and a test circuitry would be in electrical communication with the component through the third contacts formed on the backside of the support structure. Farnworth ('185) discloses, in Figs. 1 and 8, at least one opening (48I, Fig. 1) in the support structure (16MB) wherein a die (12) placed on the support structure (16MB) is drawn against the bumps (42MB) by a force generated by a vacuum and applied through the opening (48I). It would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the carrier of Farnworth et al. ('444) by providing at least one opening in the support structure for applying a vacuum through the opening as taught by Farnworth ('185) for holding and manipulating the die using a vacuum force during assembly and disassembly of the carrier.

As to claim 22, Farnworth et al. ('444) does not show a cover overlying the support structure, wherein the cover is formed as a spring element. Farnworth ('185) discloses in Fig. 1, a cover (18) overlying the support structure (12), wherein the cover (18) is formed as a spring element. It would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the carrier of Farnworth et al.

('444) by providing a cover as a spring element as taught by Farnworth ('185) in order to secure the die to the support structure.

***Response to Arguments***

7. Applicant's arguments with respect to claims have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.


***Communication***

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Minh N. Tang whose telephone number is (571) 272-1971. The examiner can normally be reached on M-F (7:00-3:30).

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nestor R. Ramirez can be reached on (571) 272-2034. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
MINH NHUT TANG  
PRIMARY EXAMINER

11/01/15